The Insect Galls of Indiana.

Mel T. Cook.

During the past summer I have received a large number of species of galls from Mr. F. C. Greene, of New Albany, Indiana. This material was collected in the vicinity of Winona Lake and contained a number of well defined species, including 17 species not recorded in my "Insect Galls of Indiana."* In order to facilitate the work of future students on the flora and fauna of the state and also to give records of distribution to the more general students who may be working over the material of a greater territory, it has been considered advisable to publish descriptions of these additional species.

Mr. Greene's collection and also my own Indiana collections made some years ago contain a number of species which I am unable to determine at this time and, in fact, many which I believe to be undescribed. My studies were made primarily from the standpoint of the botanist, and as all students of these groups well know there are frequently many difficulties in making satisfactory determinations unless the insects are taken into consideration. In most cases I did not have the insects, but made my determinations from the galls. However, I hope to take up the remaining species at a later date and make satisfactory disposition of them.

A summarization of the facts presented in this paper gives the following; an addition of 17 new species of galls making a total of 82 species known to the state. An addition of 5 new genera making a total of 33 genera.* The host plants named in this list gives us two new orders, five new families and ten new genera of host plants.

*29th Annual Report of the Department of Geology and Natural Resources of Indiana, 1904, pp. 801-867.

*My Insect Galls of Indiana gave 25 Genera, but Aldrich in his Catalogue of North American Diptera (1905) transfers Cecidomyia strobiloides O. S. to the genus Rhabdophaga, Cecidomyia solidaginis Loew to the genus Dasyneura, and Trypeta solidaginis Fitch to the genus Durosta, thus bringing my list from 25 to 28 genera.

The new orders, families and genera are indicated in the following table by italics.

Orders.	*Families.*	*Genera.*
Salicales	Salicaceae	Salix.
Juglandales	Juglandaceae	Hicoria.
		Quercus.
Rosales	Rosaceae	*Spiraea.*
Sapindales	*Balsaminaceae*	*Impatiens.*
Rhamnales	Vitaceae	Vitis.
Eridales	*Vacciniaceae*	*Vaccinium.*
Polmomiales	*Labiate*	*Glecoma.*
		Monarda.
	Cichoriaceae	*Lactuca.*
	Ambrosiaceae	*Ambrosia.*
Campanulales		Vernonia.
	Compositae	*Erigeron.*
		Rudbeckia.

HYMENOPTERA.

CYNIPIDAE.

Diastrophus similis Bassett.

Diastrophus similis—

Bassett, Can. Entom. Vol. XIII, No. 5, May 1881. p. 95.

Smith, N. J. State Bd. Agriculture 1899.

Ashmead, Trans. Amer. Entom. Soc. 1885. p. 294.

Dalla Torre, Cat. Hymen. (Cynipidae) Vol. II. 1893, p. 108.

Cook, Ohio Nat. Vol. III, No. 7 1903, p. 428.

Cook, Ohio Nat. Vol. IV, No. 6 1904. pp. 119, 120.

This gall is spherical in shape varying from ⅛ to ¾ inch in diameter. with one and sometimes more larval chambers in the center. The larval chamber is held in place by very coarse fibres which radiate from the center to the thin outside covering. It is a pale green color and occurs on the leaves and petioles of *Glecoma hederacea.* Sometimes two or more galls coalesce forming a compound structure. It was at first described

by Bassett from Connecticut and Long Island material in 1881. It has since been reported from New Jersey by Smith and the writer has collected it in Ohio.

Andricus singularis Bassett.

Cynips quercus-singularis—

Bassett, Proc. Entomol. Soc. Phil. Vol. II, 1863. p. 326.

Cynips singularis—

Osten-Sacken, Proc. Entom. Soc. Phil. Vol. IV, 1865, p. 355.

Walsh, Amer. Ent. Vol. II. 1870. p. 184.

Osten-Sacken, 7th Rept. U. S. Geol. & Geog. Sur.-Zool. 1873 & 74. p. 567.

Andricus singularis—

Bassett, Amer. Nat. Vol. XVI. p. 246.

Mayr, 20 Jahresber. Comm: Oberrealsch. I. Bes. 1881. p. 28.

Ashmead, Trans. Amer. Entomol. Soc. Vol. XII. 1885, p. 295.

Gillette, 27th Ann. Agri. Rpt. of Mich. 1888, p. 469.

Gillette, Psyche Vol. V. 1889. p. 186.

Gillette, Proc. Iowa Acad. Sci. Vol. I. Pt. 2. 1890-91. pp. 110-114.

Packard, 5th Rpt. U. S. Ent. Com. (Forest Insects) 1890. p. 105.

Beutenmüller, Bul. Amer. Mus. Nat. Hist. Vol. IV. No. 1. 1892. p. 256.

Dalla Torre, Cat. Hymen. (Cynipidae) Vol. II. 1893. p. 100.

Smith, N. J. State Bd. Agriculture. 1899.

Beutenmüller, Amer. Mus. Jour. Vol. IV. No. 4. 1904. p. 15.

This gall is formed in the spring and early summer, is spherical, green and varying from ¼ to ½-inch in diameter. The larval chamber is oblong and is held in its place by radiating fibers. The outer covering is smooth and thin. It is so placed in the leaf that 2-3 project below the lower surface and 1-3 above. It very much resembles Amphibolips inanis O. S. except that it is smaller. It has been reported by Bassett from Connecticut and has since been reported from New York, New Jersey, Iowa, Michigan. The writer has also collected it in Ohio. The reports thus far indicate that it is restricted to *Quercus rubra*.

(Note.—The gall described by me in Insects galls of Indiana. 29th Rpt. of the Dept. of Geol. and Nat. Res. of Indiana 1904, p. 836, as Holcaspis centricola O. S. was an error and should have been described as A. singularis Bassett.)

Aulux tumidus Bassett.

Aulax tumidus—

Bassett, Trans. Amer. Ent. Soc. Vol. XVII. 1890. p. 92.

Beutenmüller, Bul. Amer. Mus. Nat. Hist. Vol. IV. No. 1. 1892. p. 263.

Beutenmüller, Amer. Mus. Jour. Vol. IV. No. 4. 1904. p. 23.

Aulax tumida—

Dalla Torre, Cat. Hymen. (Cynipidae) Vol. II. 1893. p. 125.

This gall is a large, thick, knotty, irregular, rather ovate swelling which may be so small as to be scarcely noticeable or which may attain a length of two or three inches and a diameter of one inch. It is usually near the summit of the stalk and covered with the short flower stems of the panicle. The larvae are numerous, each enclosed in a thin transparent chamber and imbedded in the soft pithy tissue which fills the gall. It occurs on *Lactuca canadense* and possibly on other species. It was first described by Bassett who does not state the source of his material. It has since been reported from New York and the author has collected it in Ohio and Delaware. It no doubt has a very wide range and always occurs on *Lactuca*.

Solenozopheria vaccinii Ashmead.

Solenozopheria vaccinii—

Ashmead, Trans. Amer. Ent. Soc. Vol. XIV. 1887. p. 149.

Dalla Torre, Cat. Hymen (Cynipidae) Vol. II. 1893. p. 57.

Beutenmüller, Amer Mus. Jour. Vol. IV. No. 4. 1904. p. 22.

A more or less irregular, usually reniform gall varying from ½ to 1 inch in length, occasionally longer and may be as much as ½-inch in diameter. Green and rather pithy in summer, becoming brown, hard and rather woody in winter. Contains a large number of larval chambers. It occurs on the stems and is restricted to one side, causing the twig to be so curved as to occupy the concave surface of the gall. This gall was first described by Ashmead from collections on Florida material of *Vaccinium corymbosum*. He also states that he received what appeared to be the same gall on *V. pennsylvanicum* from Mr. Wm. Brodie, of Toronto, Canada. It has also been reported from New York by Beutenmüller. The writer has collected it in Delaware on *V. corymbosum* and another undetermined species of *Vaccinium*. Collected in Indiana on *V. corymbosum*.

TENTHREDINIDAE.

Pontania desmodioides Walsh.

Nematus salicis desmodioides—

Walsh, Proc. Ent. Soc. Phil. Vol. VI. 1866. p. 257.

Norton, Trans. Amer. Ent. Soc. Vol. I. 1867. p. 211

Dalla Torre, Cat. Hymen. Vol. I. 1894. p. 259.

Nematus inquilinus—

Walsh, Proc. Ent. Soc. Phil. Vol. VI. 1866. p. 260.

Norton, Trans. Amer. Ent. Soc. Vol. I. 1867. p. 213.

Provancher, Can. Nat. Vol. X. 1878. p. 57.

Provancher, Faun. Ent. Can. Hymen. 1883. p. 190.

Dalla Torre. Cat. Hymen. Vol. I. 1894. p. 230.

Pontania inquilina—

Marlatt. Proc. Ent. Soc. Wash. Vol. III. 1895. p. 266.

Pontania desmodioides—

Marlatt, U. S. Dept. Agri. Div. Ent. Tech. Ser. 3. p. 40. 1896.

This gall has been recently described by Marlatt as follows: "The gall is found on *Salix humilis*. It is smooth, flattish, fleshy, sessile, yellowish green, monothalamous, semi-circular in general shape like the seed of a *Desmidium* or the quarter of an orange. It is about equally divided between the two surfaces of the leaf; no rosy cheek. Generally there is but one gall on the leaf; one leaf was seen with three upon it. Length 0.23 to 0.50 inch." It has since been reported from Massachusetts, New York, Indiana, Illinois, Missouri, and Canada.

Pontania pomum Walsh.

Nematus salicis pomum—

Walsh, Proc. Ent. Soc. Phil. Vol. VI. 1866. p. 255.

Norton, Trans. Amer. Ent. Soc. Vol. I. 1867. p. 216.

Walsh and Riley, Amer. Ent. Vol. II. 1869. pp. 45-49.

Riley, 9th Rept. Ins. of Mo. 1877. p. 20.

Thomas, 10th Rept. Ins. of Ills. 1881. p. 68.

Provancher. Nat. Can. Vol. XIII. 1882. p. 292.

Provancher. Can. Hymen. 1883. p. 741.

Cresson, Syn. Hymen. Amer. 1887. p. 157.

Lintner, 5th Rept. Ins. of N. Y. 1889. p. 173.

Dalla Torre. Cat. Hymen. Vol. I. 1894. p. 259.

Nematus hospis—

Walsh, Proc. Ent. Soc. Phil. Vol. VI. 1866. p. 261.

Norton, Trans. Amer. Ent. Soc. Vol. I. 1867. p. 218.

Dalla Torre, Cat. Hymen. Vol. I. 1894. p. 229.

Nematus pomum—

Beutenmüller, Bull. Amer. Mus. Nat. Hist. Vol. IV. No. 1. 1892. p. 263.

Beutenmüller, Amer. Mus. Jour. Vol. IV. No. 4. 1904. p. 23.

Cook, Ohio Nat. Vol. IV. No. 6. 1904. p. 143.

Potania hospes—

Marlatt, Proc. Ent. Soc. Wash. Vol. III. 1895. p. 266.

Potania pomum—

Marlatt, U. S. Dept. Agri. Div. Ent. (Tech. Ser.) No. 3. 1896. p. 36.

This gall has recently been described by Marlatt as follows: "The gall *S. pomum* found on *Salix cordata* and very rarely on *S. discolor*. A smooth, fleshy, globular, or slightly oval monothalamous gall, like a miniature apple, 0.30 to 0.55-inch in diameter, growing on one side of the midrib of a leaf, and extending to its edge or beyond it. The principal part of the gall projects from the under side of the leaf; very rarely it is bisected by the leaf. Color greenish yellow, sometimes with very rosy cheeks, especially the upper surface, and often with little dots." It has been reported from New York, Ohio and Illinois. Mr. Greene's specimen is on *S. discolor*(?).

DIPTERA.

CECIDOMYIDAE.

Aspondylia cospicua Osten Sacken.

Aspondylia rudbeckiae conspicua—

Osten Sacken, Trans. Amer. Ent. Soc. Vol. III. 1870. p. 51.

Beutenmüller, Amer. Mus. Nat. Hist. Vol. XXIII. Art. XVII. 1907, p. 387.

Beutenmüller, Bull. Amer. Mus. Nat. Hist. Vol. IV. No. 1. 1892. p. 273.

Aspondylia conspicua—

Aldrich, Cat. of N. A. Dipt. 1905. p. 156.

Bergenstamm & Low, Verh. Zool.-Bot. Gesell. Wien. Vol. XXVI. 1876. p. 69.

This gall was first described by Osten Sacken as follows: "They were in one case nearly round, of the size of a large apple; the other was an

aggregation of galls of various sizes, forming a large excrescence." It has been reported from New York, North Carolina and Ohio. It occurs on *Rudbeckia triloba* and *R. laciniata*. Mr. Greene's specimen was on *R. laciniata*.

Cecidomyia caryae Osten Sacken.

Diplosis caryae—

Osten Sacken. Stettin Entomol. Zeit. 22. 1861.

Osten Sacken, Mon. N. A. Dipt. I. 1862. p. 191.

Cecidomyia caryae—

Aldrich, Cat. of N. A. Dipt. 1905. p. 159.

This gall was originally described by Osten Sacken as follows: "Gall subglobular, smooth, seed-like, 0.05 to 0.1-inch in diameter, with a small nipple at the tip. In summer they are yellowish-green and their shell is soft; in winter they become brownish, and the shell, although thin, is hard and woody. They begin to grow in June. I gathered them in October, when the larva was full grown." He does not state the species of *Hicoria* on which he collected his material. Mr. Greene's Indiana material is from *H. alba*.

Cecidomyia caryaecola Osten Sacken.

Cecidomyia caryaecola—

Osten Sacken, Mon. of the Diptera of N. A. Pt. I. 1862. p. 192.

Glover M. S. Notes from my Journ. Dipt. plate XI. fig. 24.

Beutenmüller, Amer. Mus. Jour. Vol. IV. No. 4. 1904. p. 27.

Smith, N. L. State Board of Agri. 1899.

Beutenmüller, Amer. Mus. Jour. Vol. IV. No. 4, 1904. p. 27.

Aldrich, Cat. of N. A. Dipt. 1905. p. 162.

These galls are pale green, elongated, onion-shaped with a pointed tip. Found through the summer in clusters on the under side of the leaves of the hickory. Frequently associated with *C. holotricha*. This gall has been recorded from New York and New Jersey, and I have collected it near Sandusky, Ohio. It is said to occur on several species of *Hicoria*. The Ohio and Indiana material were on *H. alba*.

Cecidomyia (?) vernoniae Beutenmüller.

Cecidomyia (?) *vernoniae*—

Beutenmüller, Amer. Mus. Nat. Hist. Vol. XXIII, Art. XVII, 1907. p. 389.

This gall was recently described by Beutenmüller as follows: "Green, sometimes tinged with red, rounded or elongated and of the texture of the stem of the plant. Inside it is soft, fleshy, and contains a single larva in an elongated narrow channel. Length about 7 to 12 mm.; width 5 to 9 mm."

"When dry the gall becomes brown and pithy inside and somewhat resembles a cherry pit. It is usually situated on the midrib of the leaf of the ironweed (*Vernonia noveboracensis*)."

Mr. Beutenmüller reports it from Black Mountains, N. C., Staten Island, N. Y., and Indiana; the last records being from the writer's material. I have since collected it in Delaware. Mr. Greene's specimen is on *Vernonia gigantia*.

Cecidomyia salicifolia Osten Sacken.

Cecidomyia salicifolia—

Osten Sacken, Proc. Ent. Soc. Phil. Vol. VI. p. 220.

Aldrich, Cat. N. A. Dipt. 1905. p. 163.

This gall bears a striking resemblance to the gall of *Cecidomyia gleditschiae* O. S. The leaves are folded along the midrib, the edges uniting and the sides bulging out, thus forming a pod like structure which may be ½-inch or more in length.

This gall was first described by Osten Sacken from material collected by Wm. Couper in Quebec. He also states that he found a similar gall at Nahant on *Spiraea tomentosa* and I have received from Dr. L. M. Underwood, of Columbia University, what appears to be the same gall on *S. tomentosa*. I have collected what appears to be the same gall in Ohio on *S. salicifolia*. Mr. Greene's Indiana material is on *S. salicifolia*.

Cecidomyia viticola Osten Sacken.

Cecidomyia viticola—

Osten Sacken, Stettin. Entomol. Zeit. 22. 1861.

Osten Sacken, Mon. Dipt. of N. A. Pt. I. 1862. p. 202.

Williams. 8th Rpt. Ent. Soc. Ont. 1877.

Saunders, Ins. Inj. to Fruits. 1883. p. 292.

Beutenmüller, Bul. Amer. Mus. Nat. Hist. Vol. IV. No. 1. 1892. p. 272.

Smith, N. J. State Board of Agri. 1899.

Beutenmüller, Amer. Mus. Jour. Vol. IV. No. 4. 1904. p. 32.

Aldrich, Cat. of N. A. Dipt. 1905. p. 164.

Cecidomyia vitis lituus—

Riley, 5th Rept. Nox. Ins. of Mo. p. 119.

Riley, Amer. Ent. Vol. II. pp. 28 & 113.

This gall may be either bright green or crimson red in color or any variation between the two. It is narrow, elongated, conical, sometimes slightly curved at tip and about 1-3 inch in length and usually on the upper surface of the leaf in great numbers. It occurs on many species of *Vitis* and has been reported from Ontario, New York, New Jersey and Missouri. The writer has also collected it in Ohio. Saunders describes it in his Insects Injurious to Fruits. So far as I know it does not attack the cultivated grapes and does not usually seriously injure the wild species. Riley reports it as attacking *V. cordifolia, V. riparia, V. labusca* and *V. vulpina.* Mr. Greene's Indiana material was on *V. bicolor.*

Cecidomyia impatientis Osten Sacken.

Cecidomyia impatientis—

Osten Sacken, Mon. Dipt. of N. A. Pt. I. 1862. p. 204.

Osten Sacken, Amer. Ent. Vol. II. 1881. p. 63.

Glover, M. S. Notes from my Journal. Pl. XI. fig. 16.

Bentenmüller, Bul. Amer. Mus. Nat. Hist. Vol. IV. No. 1. 1892. p. 269.

Smith, N. J. State Board Agri. 1899.

Beutenmüller, Amer. Mus. Nat. Hist. Vol. IV. No. 4. 1904. p. 30.

Cook, Ohio Naturalist. Vol. IV. No. 6. 1904. p. 140.

Aldrich, Cat. N. A. Dipt. 1905. p. 162.

A spherical, green, semi-transparent, succulent swelling at the base of the flower or leaf and containing one or more larval chambers Sometimes two or more galls unite forming a compound structure. Usually scarce. Has been reported from New York, New Jersey and Ohio, and the writer has recently collected it in Delaware. Mr. Greene's material was on *Impatiens biflora* and the Delaware record is for *I. aurea.*

Cecidomyia monardae Brodie.

Cecidomyia monardae—

Brodie, Biol. Rev. of Ont. 1. 1894. pp. 109-111.

Aldrich, Cat. N. A. Dipt. 1905. p. 162.

Mr. Greene's specimen answers the description of Brodie's species which so far as I know has not been reported since Brodie's original de-

scription. Brodie's description is as follows: "The galls appear like swellings on the flowering branches of *Monarda fistulosa*, from 10 to 22 mm. long, usually a little curved and retaining the quadranglar form of the branch. The average of the side of the square of 20 of the largest was 3 mm., and of the branches below the galls 1.5 mm."

"This gall is usually found on plants growing in open woods, it is very rare on robust plants growing on exposed situations."

"The walls of the gall are hard and woody but thin; the interior is a soft, pith-like substance, through which the larva tunnels freely, and on which it feeds."

CECIDOMYIA EREGERONTIS Brodie (?)

Diplosis eregeroni—

Brodie, Biol. Rev. of Ont. Vol. I. No. 1. p. 13.

Cecidomyia eregerontis—

Aldrich, Cat. of N. A. Diptera. 1905. p. 162.

This gall was described by Brodie as follows: "Variously situated from base of stem to tips of branches of flowering panicle; galls irregularly cylindrical, tapering at both ends, spindle-form, those on the branches more or less spherical; from 1 to 15 galls on a plant, seldom more than 10; found usually on diminutive plants such as grow on wet, sandy places or on high dry banks."

"As yet I have not found these galls on robust plants."

"The galls appear like swellings of the stem or branches, uniform in color with the plant, the surface with feint longitudinal lines, slightly elevated ridges and ragged transverse elevations, resembling leaf scars."

So far as I am able to determine this gall has not been reported since the original description, but during the past summer I collected what appears to be the same gall at Lewes, Delaware. All collections to date have been on *Erigeron canadense*.

TRYPETIDAE.

OEDASPIS GIBBA Loew.

Trypeta gibba—

Osten Sacken, Psyche. Vol. III. No. 72. 1880. p. 53

Oedaspis gibba—

Loew, Mon. of N. A. Dipt. Vol. III. p. 260.

Aldrich, Cat. of the N. A. Dipt. 1905. p. 606.

The determination of this gall is uncertain, but it is probably Osten Sacken's *T. gibba*, which was described from material collected by Mr. J. Boll, Dallas, Texas, on *Ambrosia sp.* Osten Sacken's description is very short and as follows: "The gall is an oblong swelling of the stem, probably terminal." Mr. Greene's Indiana specimen was on *A. trifida.*

HEMIPTERIA.

APHIDAE.

Phylloxera deplanata Pergande.

Phylloxera deplanata—

Pergande, North American Phylloxerinae. 1904. p. 205.

This gall has been reported from the D. C. by Pergande, who states that it is very similar to *P. semen* Walsh. He describes it as follows: "The leaves of some of the smaller trees are often literally covered with the galls of *deplanata* which then produce a sickly, yellowish and crumpled appearance thereof. By the end of June the galls are deserted, brown and dry, or else have completely decayed, leaving innumerable holes in the affected leaves, seriously affecting the health of the tree. When but few days old (first week in May) these galls resemble minute yellow specks."

"The transverse diameter of the mature galls varies from 1 to 5 mm.; height about 1 mm.; walls rather thin above and beneath and semi-transparent. Upper surface projecting but little above the plane of the leaf, convex, usually with a shallow fovea; frequently not central and occasionally with a slight central elevation. Under side more strongly convex, sometimes almost conical, the nipple usually more or less flattened and generally leaning to one side, as if pressed down when young; with the orifice usually oval, though sometimes more or less rounded, and which before maturity is perfectly closed and densely fringed with short pale hairs. Color above either reddish with depression yellowish, or almost entirely greenish-yellow; below purplish, or dull greenish-yellow. Many of the galls are conjoint, i. e., contains from 2 to 6 or more stem mothers, together with a large number of eggs and sexual individuals, the cavity being completely crowded."

Pergande reports this gall on *Hicoria tomentosa.* Mr. Greene's specimen was on *H. alba.*